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MONTHLY REVIEW

Published by the

American Electroplaters' Society

ONEIDA, NEW YORK

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PRESIDENT'S MARCH MESSAGE
OUR CONVENTION

Greetings to the Membership:

OUR CONVENTION:

Should result in less aggressive attitude toward others of **different opinions,** a better understanding of those differences and a clearer conception of conditions which produce them. And there grows from this a broader vision, a more comprehensive outlook, and a disposition toward a National or UNIVERSAL, rather than a SECTIONAL attitude.

This influence is exerted to some extent, it is true, by all the National gatherings of men who assemble for reasons other than those of SELF-INTERST. But it is particularly true of the American Electroplaters' Society because of its DEFINITE EDUCATIONAL PURPOSE and its fundamental principles, which are wholly dissociated from any personal interests, and which bind its members together in their ALTRUISTIC and BENEVOLENT purposes.

The extent of this influence cannot be measured, but its effect is obvious. The American Electroplaters' Society is a more unified society, its members are more broadly National in their VISION, because of our Society, and its ANNUAL CONVENTIONS, by reason of the associations and contacts that are incident to them, are peculiarly effective in promoting that happy result. SECTIONALISM should not exist in the atmosphere of our SOCIETY or CONVENTIONS, but is naturally and surely converted and elevated into a true and broadminded IDEA of our PURPOSE and PERFORMANCE.

Every Convention of the AMERICAN ELECTROPLATERS' SOCIETY is a repeated demonstration of the

Influence of this SOCIETY in obliterating SECTIONALISM and in building up in our Society and country a broad and unifying NATIONAL SPIRIT.

In the use of the word "SECTIONALISM" here no reference is intended to any particular geographical lines, but rather to that spirit of provincialism that is inevitably engendered by conditions which are naturally peculiar to the different sections of so broad a domain as our Society covers, and which necessarily create interests and viewpoints that are divergent and sometimes antagonistic, which tend to a narrow and restricted OUTLOOK.

In the ANNUAL conventions of the Society hundreds of MEN and WOMEN from every section of the UNITED STATES and CANADA are brought together and thrown into intimate contacts in circumstances that naturally ASSURE a friendly ASSOCIATION. What ever may be the differences of personal interests, of mental attitude, of customs, of habits of speech, political opinions, religious belief or business activities, there is an enevitable impulse toward FRATERNAL consideration and courteous tolerance which softens, if it does not totally eradicate, the antagonisms that might display themselves in a gathering of such men and women not bound together by the FUNDAMENTALS of livelihood, EDUCATION.

And in view of the above and in addition to the fact that this is the first time in our 15 years of experience this SOCIETY will convene outside of the UNITED STATES in ANNUAL convention, EVERY MEMBER of the SOCIETY, whether he be a DELEGATE or not, should make HONEST effort to attend this most important ANNUAL MEETING at MONTREAL, CANADA, on JUNE 29, 30; July 1, 2, 1925, and I feel reasonably safe in venturing to guarantee that you will be a BIGGER MAN and the SOCIETY more appreciated by you, to the Satisfaction and PROSPERITY of us all.

ON TO MONTREAL

The following report comes from Chicago:

The present outlook is that we will have three cars on International Limited, Grand Trunk R. R., going to Montreal on June 26. There is one entire car reserved already.

CLEANERS, PAST AND PRESENT

By C. E. Stiers, New York Branch

Many years ago, before the people of this earth lived in prominent cities but traveled around and lived in tents and did their cooking with wood, it was customary to anoint their bodies with sweet-scented oils, and it was found that these oils were much more easily removed if they wet the skin and rubbed themselves with wood ashes. This started someone thinking and experimenting, and it was found that by running water through wood ashes a dark brown liquid was obtained and by boiling grease in this liquid a jelly-like substance was obtained which was called soap. This brown liquid was called alkali, and is used today by the farmers to make soap. All alkalies were obtained from vegetable matter, wood ashes and sea weeds being the most prominent source, up until about sixty years ago. During that time various experiments were tried and some good alkalies were produced from other sources, but the price was prohibitive.

In 1866 a German by the name of Solvay discovered the present method of making commercial alkalies, which was a wonderful discovery, as the supply of vegetable matter was fast disappearing. The materials Mr. Solvay used were taken from the ground, and there seemed to be an abundant supply. The one bad feature of the present commercial alkalies is that water will not liberate them—that is, they will not rinse.

Toilet soap and laundry soap chips are boiled from 80 to 100 hours and the alkali is almost boiled away, but this kind of soap is not much good for cleansing greasy surfaces or articles. It is a good carrier of insoluble dirt, and is necessary in a laundry for this purpose.

The cheap soap powders and brown cake soaps are just boiled enough to soponify the grease and contains a large percentage of commercial alkali. They cleanse very rapidly, but leave an alkali film on the article cleaned and unless a neutralizing agent is used, it is detrimental to any delicate article or to a coating or finish that is applied to an article.

Outside of the laundry there are very few places where

soap should be used, as suds is the grease and the alkali alone can be used to a greater advantage, and if the grease to be removed is a vegetable or an animal fat, thecommercial alkali will soponify it and thus remove it and a weak acid neutralizing bath used to remove the film, a clean article will be obtained, but today there are very few vegetable or animal oils used—most all are mineral oils—especially is this true in the metal trades and therefore they can not be soponified, but must be emulsified, and this cannot be done efficiently with a commercial alkali.

A few years ago a method was discovered to combine alkalies with other ingredients into a compound which could be fused by heat so as to retain the physical or cleaning action, and by adding a certain amount to boiling water an emulsifying solution could be produced which would hold its cleaning strength, kept at a boiling temperature and would remove mineral oil very readily. This method has been improved on and today we have metal cleaners that work very efficiently, and which will rinse in water so that there is no detrimental effect to the finish applied afterward.

Quite frequently a firm will have an analysis made of such a cleaner and find out the ingredients in it and decide to save the difference in the price of the raw materials and that of the finished product for their own use, or derive the difference as a profit by manufacturing it to sell, by mixing the raw materials together dry, and are further misled by getting a quick action when added to boiling water. This is caused by the reaction of one alkali on another in a boiling solution. And while this fight is going on there will be a cleaning action on most anything that is placed in it, but it soon dies out and more has to be added to keep up the fight, for as soon as this reaction is over, they have only a caustic solution left, and these frequent additions run the cost up quite rapidly.

Analysis does not tell them how the materials are put together or at what temperature the fusing takes place. I know that one concern tried to duplicate a well-known cleaner that was made in Germany. They decomposed it and segregated each ingredient, but could not put it back

the same as it was. They experimented for over three years, but were unsuccessful in recombining these ingredients to look or work like the original compound.

Some metal cleaners contain a small percentage of insoluble material. There has been various opinions expressed as for this being present. Some say it is added to give weight, others that it is a chemical reaction of the ingredients used to manufacture the cleaner, but those who have experimented with metal cleaners of this nature and tried them with the insoluble and then tried the same solution after straining it out, have agreed that it has merits and was put there for a purpose, but the tanks must be equipped to use it—that is, a solution of this kind must be agitated either by boiling or by air being introduced into the tank or by mechanical means. Some agitate the work. If this agitation is not produced the insoluble will lay on the bottom of the tank and will not be of any benefit.

Dr. Watts of the University of Wisconsin, who is an authority on cleaning and plating, wrote and spoke against insoluble matter in cleaners for years, but two years ago at the A. E. S. Convention in Indianapolis, he read a paper which said that after a lot of experimenting he had changed his opinion, and if the proper kind of insoluble was used it was an important factor, as it produced a mechanical action in conjunction with the chemical action, but this insoluble matter should be a light, flaky substance which would stay in suspension easily and must be a natural formation as a ground material would not be a flake but all shapes.

I would like to add one more thing, and that is this, that it be soluble in a 10 or 20 to one solution of muriatic acid and water which would eliminate the possibility of any of the insoluble remaining in the hollows or depressions of irregular shaped articles. All work of this nature should be emersed in a bath of this kind after cleaning and rinsing before going into the plating solution. Any one using a metal cleaner with insoluble material can easily tell if it is soluble in a bath of this kind by stirring up the solution and taking out a half glass and drop a few drops of muriatic acid into it. The solution should clear up immediately.

You will find that a metal cleaner—that is, a mixture—will dissolve very readily, while a fused cleaner dissolves very slowly. In fact, it is almost impossible to dissolve it unless it is boiled for half an hour or more. I also find a difference in opinion as to what boiling means. To me, boiling is having the solution rolling. Often a metal cleaner is condemned because it does not work when first made up. Care has been taken to use the proper amount as instructed and the solution is hot enough to have steam come off of it but has not actually boiled. When it does not clean, more cleaner is added, which runs up the cost, and in a few days, when it has all dissolved, it is too strong. Also, some think if a little does good, more will do better, and this is not always true, as some metal cleaners form a concentrated solution quicker than others.

In closing I would like to mention some things to be considered in selecting metal cleaners:

Find out if the firm under whose name it is sold are equipped to fuse or compound a cleaner. Remember, it is an expensive proposition to equip and maintain a plant of this kind and requires a large output to make it profitable. That is why there are so few alkali manufacturers. Do the manufacturers devote all of their time and energy to the manufacturing of cleaners or is it just one of the many things they are supplying the trade? You may find that it is only a method of disposing of a by-product. Do not form your opinion on your first impression of a metal cleaner—give it a chance, for you cannot base your cleaning cost on the price per pound but on the cost per week, month and year.

Few people can tell the difference between a $5 or $10 pair of shoes the first time they try them on, but any child can pick them out after they are worn a year.

Arrange your tanks so they will boil and put the coils on the side instead of the bottom. This will give more action to the boiling solution and will not become insulated by the dirt that collects on the bottom. Put them on the side the work is put in from. This will throw the grease that collects on the top away from the workman and leave clean solution to pull the work through when taken from

the tank. When the proper working conditions are arranged the metal cleaner to use is one that cleans rapidly, rinses thoroughly, does not have any offensive odor, will not tarnish highly polished work and you will find that a metal cleaner of this kind will be economical to use.

THE MANNER OR METHOD OF PLATING OF BRASS, STEEL AND DYE CAST PHONOGRAPH CABINET HARDWARE FOR DULL OR SEMI-DULL GOLD FINISH

Let me say at the beginning that it is not my intention to have you think that these methods of mine are fool-proof or even above the average in efficiency. Considerable depends upon the operator at the tanks, as it does in many cases, and a foreman plater's lot is made easier on many occasions by having intelligent, conscientious helpers on the job; and, again, it has been some four or five years since I have actually handled work of this nature, and in that time perhaps many and varied ways have been pursued in the production of this type of work. Sufficient it will be to say that plate these parts I did in a more or less commercical manner for a period of a year or more. As those of you who are familiar with this line of work know, that at the outset it was desired by the hardware trade to have this work finished in a dull brushed or matt surface, and for a while most everything on the cabinet was brushed before gilding in some fashion or other, including even the small parts, but after a while competition, production and a cheaper product made it necessary to find simple and quicker methods to get the work out, even at the cost of finish and general quality. So, with these things confronting you, an effort was naturally made to meet the situation, and the following was what I did to meet it: Regarding the first-mentioned brass parts of which there were considerable like tone arms, reproducers, butts, knobs and the like. Door knobs, which usually came to me either in cast or bar metal and in a polished condition without much grease or dirt, were racked on pins on a brass rack containing from 25 to 50 pieces, were then placed in an electric cleaner of the soda ash caustic and tri-sodium phosphate type and allowed

to remain for a minute or so, removed and placed in an aqua fortis dip for a light burn-off, removed and passed through a bright dip and rinsed well and flashed in the gold solution for 10 seconds or so, rinsed and dried in an oven and then lacquered right on the rack. The small brass butts were handled in a like manner. They did not have the brushed effect, but they had a pleasing, half dull appearance and got by.

Tone arms and reproducers I found more troublesome on account of the plain surface, and considerable of it always looked far better if they were first cut down on the buff, given a cleaning and a bright dip and then brushed with a fine crimped brass wire scratch brush, flashed in the brass solution for a moment and rinsed and then placed in the gold solution for ten or fifteen seconds, rinsed and dried and lacquered with a semi-flat lacquer by the spray method. The steel parts, such as butts, brakes and needle cups, were either polished or done in the raw, according to their condition and either wired or racked as the need be, and after cleaning in an electric cleaner were dipped in an acid solution containing 2 parts oil of vitriol, 1 part nitric acid and ¼ part water, from which they came with a semi-dull mat surface, but with a slight smut, which was readily removable in a strong cyanide solution used cold, then placed in a warm cyanide copper solution run bright, with small addition of hyposulphite of soda struck up for a minute, and then run on slow current for three or four minutes, removed, rinsed and placed in a brass solution for a minute or so, rinsed and flashed in the gold solution, with the exception of the steel hinges of the larger size, which run more or less streaked, due to the segments of the hinge spitting out dirt, and which made it necessary to brush most of them before gilding. The needle cups were plated on racks containing 40 pieces and were held over the backs with a circular wire spring, made slightly smaller than the cup and contacted under the lip or bead, and were placed back to back, 4 rows, 5 in a row. On handling the many small crews that are used on the cabinet for the parts, I had a system whereby I took them—which, by the way—were mostly of iron, from their containers and placed them

in quantities of from 5 to 15 gross in a brass mesh basket about 6 by 4 inches in size and cleaned them in the electric cleaner and placed them in the copper solution for about 10 minutes and got a nice red deposit and then passed them through a bright dip not too active in effect, and then placed several baskets of them in a brass solution for a few moments with very slow current for the purpose of getting a pale bronze color, and then removed them, rinsed them well and placed them in a perforated earthenware jar, and immersed them in an immersion dip gold solution for a half minute or so, which was contained in a cast iron pot on a gas stove and heated to 180 degrees Fahr. The dip gold solution was as follows:

Sodium ferro-cyanide, 4 ozs.; gold in fulminate form, 5 pwt.; sodium hydroxide, ½ oz.; soda ash, 1 oz.; phosphate of soda, 4 oz.; sodium cyanide, ⅛ oz.. After immersion they were rinsed and dried and lacquered on mesh wire frames by the spray method. Two men working together at this job would turn out a thousand gross of screws with $10 to $12 worth of gold in a working day of 7 hours.

Regarding the dye casting work, of which there was not a great lot, it was emeryed and buffed with a grease wheel and then colored to remove most of the tripoli to avoid the nasty cleaning with gasoline or the like, and either racked or wired and struck in a mild soda ash and tri-sodium phosphate electric cleaner for about 10 seconds, and then passed through another cleaner of like nature without current for a count of seven or eight; rinsed and passed through a mild hydrochloric acid dip of about ¼ pint per gal. of water, and then into a cyanide dip about 2 or 3 ozs. per gal., rinsed and placed directly into the nickel solution and struck up on high current of 4 volts for a moment and then reduced to any degree sufficient to carry the type of work in the batch without undue burning of extremities for a period of three to five minutes only and then removed and placed in the brass bath for 5 or 10 minutes, removed and brushed with a fine crimped wire brush, passed through a cleaner and flashed in the brass again for a moment, and then into the gold, rinsed, dried and lacquered as the other parts. I must say that with the dye castings I had more trouble than

the other work, due to porousness, streaks and the like, but got through them more or less successful. The nickel solution used for the dye castings was as follows: Water, 1 gal.; single nickel salts, 8 ozs.; double salts, 4 ozs.; epsom salts, 2 ozs.; sodium citrate, 2 ozs. The last named of which was added to prevent burning to some extent of the extremities.

METAL CYANIDES

Address delivered by William J. Schneider before the New York Branch of the American Electroplaters' Society on Friday, Nov. 14, 1924

Mr. Chairman, Fellow-Members of the American Electroplaters' Society and My Good Friends:

I am fully appreciative of the honor and distinction which you have conferred upon me in delegating to me the privilege of inaugurating the 1925 season of the A. E. S. by addressing you on the subject of "Metal Cyanides."

You will probably be interested to look into the history somewhat of this important advancement in electroplating and see why it has come to be almost universally accepted in modern plating establishments.

The discovery of metal cyanides belongs to no single individual, but by an extraordinary coincidence (I don't believe it was any steal) it was made by two individuals interested in the same subject and both working in the same direction with a definite object in view—Roseleur and Napier, F. C. S. Each one published a book on his discovery and I recommend that you gentlemen look them over to see what a complex problem these scientists had to deal with.

I'm going to take the liberty of reading an extract to you of the difficulty Napier encountered in preparing a solution of copper by means of potassium cyanide.

"To a solution of copper sulphate add by degrees a solution of cyanide of potassium, which will give a yellowish green precipitate, with a slight effervescence. There will be evolved a gas having a most pungent odor, to prevent inhalation of which the most watchful carefulness has to be exercised, as it is very deleterious. It will be found that the copper is not all precipitated by the cyanide of potassium, for, according to this mode, the solution remains a greenish

blue when the precipitate ceases to be formed, probably owing to the decomposition of the cyanade of potassium and the formation of ammonia, which holds copper in solution and forms also some complicated compounds with the cyanides of copper."

The loss of copper in this, gentlemen, is very considerable—in fact, about 20 per cent. of the whole.

This is enough to show you, my friends, that a good deal of presistence was required, and courage to experiment with deadly poisons, as well as ingenuity and intelligence, to work out this problem.

In the perfecting of the process, even greater complications had to enter and it would be imposing on your time and good nature if I attempted to outline, in a general way, the modern manufacture of, say copper cyanide.

It is enough to say that it is an extremely difficult and costly procedure, but what you want to know probably is why it is to your interest as platers, and to the interest of the men for whom you're working to use a cyanide salt in making up and replenshing your plating baths, rather than the old-fashioned method of converting ineffective salts to the cyanide in the tank.

At the outset, some of you may be surprised to hear that a saving of 15 to 20 per cent. is put at your disposal by the use of ready-made cyanides. This is not an assertion from theoretical investigation, but a conclusion reached after exhaustive practical trials in hundreds of plating shops in this country, over a working period of a number of years. To prove to you how this saving is calculated, in cold figures:

One pound of Copper Carbonate contains 50% of metal

One pound of Copper Cyanide contains 70% of metal

Therefore, 11 1-3 ozs. of copper cyanide will contain as much metal—the only factor in which you are interested—as 16 ozs. of copper carbonate.

To dissolve 1 lb. of copper carbonate 1¾ lbs. sodium cyanide are required.

To get an equal amount of copper into solution from the cyanide salt, only ¾ lb. sodium cyanide are required.

In round figures this general calculation:

1 lb. Copper Carbonate at	17c
1¾ lb. Sodium Cyanide at	38c
	55c
11 1-3 ozs. Copper Cyanide at	34c
¾ lb. Sodium Cyanide at	16c
	50c

will show you a large saving in the price of chemicals, and in addition you realize what is not indicated here—the saving of your time and labor, which is a considerable item in dissolving the carbonate.

But I want not only to persuade you, gentlemen, that you are going to save money, as well as your time and effort by using metal cyanides, but to prove to you that your solutions are going to give you less trouble in use and replenishment, last longer, and give better plating results from the cyanides. Ever since the time of Roseleur, scientists have recognized that solutions of high inert material density are never as efficient as those of low density, such as when metal cyanides are used. The use of carbonates, chlorides, sulphates, means the introduction of a large amount of waste, inert, useless material into your baths; by replenishment they keep accumulating until sooner or later the point is reached where the solution can stand no more leading, and you get trouble, lose money, and have to call in WJS to help you out. The platers who stick to the admittedly old-fashioned salts remind me of the difference, or should I say, the distinction between the young fellow and the old duffer—the spirit is willing but the flesh is weak.

The way platers are going over to the cyanides makes it pretty apparent that they recognize that cyanides are the ideal plating salts. They contain a larger amount of metal than any other you can use and they contain in addition cyanogen, which you need all the time. The years of service which cyanide solution give without trouble is enough of a contrast to the experience which you, gentlemen, have had with the old salts to make you want to discard everything but a cyanide solution. Nothing can compare in ef-

ficiency to metal cyanides, because they give you everything you need, and leave out all waste matter.

This applies equally to all the metal cyanides—not only copper. For instance, silver cyanide contains 80 per cent. silver, as compared with 70-75 per cent. for silver chloride. Zinc and all the rest are the same way. They save you money. Also sodium gold cyanide, which has recently been developed, containing 46 per cent. fine gold.

There may be some among you who think you could not stand the loss of throwing away your old solutions and replacing outright with metal cyanides. You don't need to throw out the old baths—you can replace them gradually with the more efficient cyanide salts, and your solutions will work better all the time. There are perhaps a surprising number of my friends in this room who are hiding their heads in the sand. They had better watch out, for their competitors may come along and pull out all their tail feathers. And with the old salts you are risking your necks all the time. In this connection I'd like to refer you to the danger which old Napier discovered—and warned his students against—the evolution of one of the most deadly gases known to chemical science—and one in common use, with a good many precautions, of course, as an exterminating agent—hydrocyanic acid gas.

At the risk of imposing on your patience, my friends, to show you how the early recognition of the value of metal cyanides for plating provided the great impetus for the ambitious purpose of deevloping them on a practical commercial scale, I want to refer for a minute to some of the early users of cyanides in this county. I am prevented for obvious reasons from mentioning specific names, but I can say that one of the largest platers in this country and located in New Britain, Connecticut, was one of the first to become interested in the advantages of metal cyanides, particularly that of copper. He approached representatives of that firm, which has contributed more than any other to the development of cyanides, and at present is the leading producer in this country, and asked that firm to submit a proposition for the manufacture of a ton of copper cyanide. The price at first offered seemed pretty high, but when the chemical

manufacturer learned that there were great possibilities in making copper and zinc cyanides, and the great improvements possible with such salts would soon drive out the old-fashioned stuff, assuming that large production would make a low cost possible, he radically revised his calculations and offered such a low price that one ton of copper cyanide was ordere dat once.

This began the production and consumption of metal cyanides on an enormous scale, and there still remains but few platers, who are not convinced that the cyanides are the only thing to use.

Without trying to give undue credit to my principals, it is only fair to say that they alone are responsible for making the development practical on a big scale. It required a number of years of costly effort, the devising of special apparatus, exhaustive research work, in co-operation with plating establishments from one end of this country to the other, to make the result a success. The benefit of that work is now made available to every plater in the country, and incidentally, I might say that a few chemical manufacturers here and abroad are also deriving the benefit, by a process of imitation that is not so completely successful as to equal the quality of the original producers.

Now, to sum up, gentlemen. . . . I am afraid that I have already had more than my share of your time. First, with metal cyanides you get an actual saving of 15 to 20 per cent., and nobody can deny this. Moreover, you save yourself work and time. Your deposits are greatly improved. The superiority of the results from a copper cyanide bath is so marked that a prominent plating superintendent of my acquaintance in his experimental work insisted upon having nothing but cyanides, for carbonates would not give accurate and dependable results. In short, cyanide stands for efficiency, for it cuts out inert chemicals that reduce the working power of solutions, it gives a better deposit, avoids pitting, requires less time and current, and is the easiest to replensh in a bath.

The time is not far distant, gentlemen, when platers will use nothing but metal cyanides, and to hasten the coming of that day, I'm here to offer you my services.

ELECTROPLATING ANTIMONIAL LEAD

Successful Methods—Some Phases of Chemical Analysis, by Harvey Miller, New York Branch

The following information as given in this paper, the methods, plating processes, etc., as described, are based on practical experience and results of daily practice for volume production. The methods and processes involved apply to electroplating casket hardware, and antimonial lead in general. In this article it is not my object to cover the subject in detail, but to explain some important features of practical value.

No doubt we are all familiar with the characteristics of lead, being readily tarnishable on exposure to the air and various elements. It i smore or less attacked by the cleaning solution with the formation of a film of oxide, the extent of which will depend upon the amount of handling and exposure in cleaning. Adequate methods for obtaining chemically clean surfaces which require the least amount of exposure to corrosive action is necessary, not only from the point of economy of operation, but to leave the metal surface unchanged. The condition of the articles as received for plating will determine the method necessary for proper cleaning. If badly corroded or greasy from the polishing this will first have to be removed by mechanical means, which requires time and effort. Proper methods for polishing will eliminate conditions of this sort. The polishing, if corectly done, will be almost entirely free from grease and dirt. The mild alkali cleaner, with small percentage of sodium hydroxide, makes the most suitable cleaning solution. For removing the film of lead oxide, the solution used is composed of sodium cyanide 1½ to 2 ounces per gallon, using steel anodes, temp. about 160° F. and about 5 volts. The articles as received are placed in the cleaning solution, or rather just dipped in, and into the water, then into the electric strike, the hydrogen reducing the lead oxide, leaving the metal surface chemically clean, which is the basis of adherent deposits, free from stains..

In this way the polished surface is retained. The work is now given a deposit of nickel as a base for subsequent

plating of silver and other metals. By this method of cleaning large volumes are handled daily; in fact, as much as six to seven tons, with comparatively small loss. For brass plating clean as above, then flash in brass before nickeling. This will prevent blistering of the deposit, due to current conditions.

The proper solutions to use most suitable for the respective classes of articles is of utmost importance for volume production. For antique silver finishes a silver solution composed of 3 ounces of silver and 5 ounces of free cyanide per gallon, using 1.8 volt pressure, will give uniform results. The silver depositing uniformly and free from thin spots, permitting finishing with minimum loss. A suitable solution for silver plating large pieces, such as rails, which require striking and subsequent plating in the same solution, is composed of 1½ ounces of silver and 9 ounces of free cyanide per gallon. Using from 5 to 6 volts for striking, reducing the voltage to 1.4 volts will give the proper current density for plating. A silver solution of this composition is very satisfactory for plating large surface areas, as burial caskets, striking up sharply, and by proper regulation of the current, produces a very desirable deposit of silver for this class of goods.

For copper and bronze finishes the acid copper solution is by far the most suitable to use for copper plating this metal, as there is practically no waste and permits of more rapid methods for handling. For the acid copper solution 1 pound of sulphate of copper, 2 to 2½ ounces of sulphuric acid, and ½ ounce of molasses per gallon. This solution has good throwing properties and deposits smoothly. Oxidizing copper, or more correctly, sulphurizing, is more or less troublesome ordinarily, especially for large polished surfaces requiring a deep black and polishing to a high luster. The oxidizing flaking off, when sufficiently black, is the troublesome feature. The principle factor in producing this effect is the character of the copper deposit. A coarse-grained deposit is more adaptable. For the copper cyanide solution 2 to 2½ ounces of copper and 3 ounces of free cyanide per gallon, temp. about 90 to 100° F. If the deposit is too coarse or smutty a small amount of bisulphite

of soda can be used, about ½ ounce per gallon. With a solution of about this composition, and by adjusting the current properly, a deposit will be obtained of the right character for blacking and polishing. If the copper is deposited from the acid copper solution best results will be obtained by first blacking in the sulphuret solution, then stripping off in strong cyanide solution and reblacking.

We have a great deal of information pertaining to the analysis of solutions and standard methods of analysis as applied to plating solutions, for determination of the constituents necessary for proper maintenance and control. The phases of analysis most discussed do not involve the determination of the mixture of salts in the solution or in what combination of salts the material is, should we desire to know, for the practical value of aiding in adjustment of the solution.

For methods of analysis to be used along this line I have nothing new to offer. I will outline a method of quantitative analysis, by which I have analyzed nickel Electroplating salts and solutions, with the idea of bringing out some phases which will be of interest to those who desire to work along this line. The methods given are standard methods of analysis, and in addition to the determinations, the method of calculation for combinations, as outlined, is applied for the complete quantitative analysis of a mixture of nickel electroplating salts.

Method of analysis of nickel electroplating salt.

Weigh exactly 2.0 grams of the salt and dissolve in warm water. Rinse into a 500 c. c. graduated flask, cool and very carefully make up to the mark. Thoroughly mix.

Determination of Nickel

Method No. 1.—Aliquot 50 c. c. by means of a 50 c. c. pipitte into a 500 c. c. casserole. Add 5 c. c. of concentrated sulphuric acid and evaporate to the dense white fumes of sulphuric anhydride. Cool and dilute to about 200 c. c. after rinsing into a 250 c. c. beaker. Just neutralize with ammonia and then add 15 c. c. excess. Electrolize for about 5 hours using 1 ampere and 3 volts upon a weighed plantinum cathode. A platinum spiral can be used for the anode. Thoroughly rinse, and dry in an oven at 100° C.

$$\frac{\text{Increase in weight x10x100}}{2} = \%\text{Ni}$$

Method No. 2.—Aliquot 50 c. c. dilute to 100 c. c. add 2 c. c. sulphuric acid, make slightly ammoniacal, and add 5 c. c. 10% solution of potassium iodide as an indicator. Run in from the burette 2 c. c. N/10 solution of silver nitrate, and titrate with standard cyanide solution until the turpidity is just discharged, then add a few c. c. in excess, and titrate back with N/10 silver nitrate to reappearance of the turpidity.

No. of c.c Na Cn—c.c.10n/$agno_3$×.0029×10×100=% Ni.

Standard sodium cyanide solution equivalent in n/10 $agno_3$=.00293 gr. ni.

Determination of sulphate radicle (SO_4)

Aliquot 50 c.c. into a 300 c.c. beaker and add 3 c.c. conc. hydrochloric acid. Dilute to about 200 c.c. and heat to boiling. Add to the boiling solution 15 c.c. of a saturated solution of barium chloride, drop by drop, so as not to stop the boiling. Cover and allow to boil for about 15 minutes. After the precipitate has settled filter and wash with hot water. Ignite in a weighed platinum or porcelain crucible, using finally the full heat of the bunsen burner. Cool and weigh.

$$\frac{\text{Weight of Ba } SO_4\text{X.4115X10X100}}{2} = \%\ SO_4$$

Determination of chloride radicle (Cl)

Aliquot 50 c.c. of solution and place in a porcelain dish. Dilute with distilled water to about 100 c.c. and add 2 drops of a 10% solution of potassium chromate. Titrate slowly with n/10 solution of silver nitrate until the first red tinge is seen.

$$\frac{\text{C.C. n/10 ag } NO_3\text{×.003545×10×100}}{2} = \%\ \text{Cl.}$$

Determination of Ammonium radicle (NH_4)

Aliquot 50 c.c. into a 500 c.c. Kjildahl flask. Connect the flask by means of a spray trap to a straight Liebig condenser. Allow the end of the condenser to dip into a 500 c.c. erlenmeyer flask, in which is placed by means of a

pipette 50 c.c. n/10 HCl solution and 2 drops of methyl orange indicator, dilute with about 100 c.c. of water. Let the end of the condenser just dip beneath the solution. Add to the solution of nickel 50 c.c. of a strong solution of sodium hydroxide and distil until about 150 c.c. have passed over. Disconnect the condenser, rinse the tube and titrate the excess acid with n/10 Na OH solution.

C.C. n/10 HCl—c.c. n/10 NaOH$\times$.0018$\times$10$\times$100=% NH_4

2

Qualitative test for boric acid

Evaporate about 5 c.c. of the solution to about 2 c.c. volume and add a few drops of conc. H_2SO_4 and 5 c.c. alcohol in a porcelain crucible. Ignite the alcohol. If the edge of the flame is a green color boric acid is present.

Make flame test for sodium to prove its presence.

If magnesium is present and it is desired to determine both it and sodium, it can best be done as follows:

Take the solution remaining from the electrolysis of the nickel and evaporate carefully to dryness on a water bath in a platinum dish (weighed). Heat very gently until the ammonium salts are all driven off. Add a few c.c. of water to the residue and 3 drops of conc. sulphuric acid. Carefully evaporate to dryness over the free flame and ignite at a low red heat until all acid is driven off. Cool and weigh as the combined sulphates of magnesium and sodium. Dissolve the residue in about 100 c.c. of water, and add 3 grams of ammonium chloride, and a few drops of ammonia and then 15 c.c. of a saturated solution of microscosmic salt. Stir until a precipitate begins to form and then add 15 c.c. conc. ammonia. Allow to stand for 6 hours and weigh on a weighed Gooch, washing with water containing a little ammonia. Ignite to constant weight over the blast lamp.

Weight $Mg_2P_2O_7\times.2184\times10\times100$=100% Mg.

2

(Combined weight $MgSO_4+Na_2SO_4$—Weight $Mg_2P_2O_7\times1.081)\times.3238\times10\times100$=% Na.

$$.2184=\frac{2\text{ Mg.}}{Mg_2P_2O_7} \qquad 1.081=\frac{2\text{ Mg.}SO_4}{Mg_2P_2O_7} \qquad .3238=\frac{2\text{ Na}}{Na._2SO_4}$$

Determination of Iron (Impurity)

To 50 c.c. in a 400 c.c. breaker add 5 c.c. conc, nitric acid and heat to boiling. Dilute to about 100 c.c. and dissolve 10 grams of ammonium chloride in the solution. Add ammonium hydroxide until strongly alkaline, filter and wash. Dissolve precipitate on the filter with hot dilute hydrochloric acid, and reprecipitate with ammonium hydroxide. Filter on ashless filter paper and wash thoroughly. Place the filter paper in a weighed porcelain crucible and ignite to a dull red heat. Cool and weigh as Fe_2O_3.

$$.6994 = \frac{2\ Fe}{Fe_2O_3} \qquad Weight\ Fe_2O_3 \times .6994 \times 10 \times 100 = \%\ Fe.$$

$$\frac{2}{}$$

Method of calculation for combinations

$$\%NH_4 \times \frac{NiSO_4(NH_4)_2SO_4 6H_2O}{2NH_4} = \%NiSO_4(NH_4)_2SO_4 6H_2O$$

$$\%NiSO_4(NH_4)_2SO_4 6H_2O \times \frac{2(SO_4)}{NiSO_4(NH_4)_2SO_4 6H_2O} = \%SO_4 \text{ necessary for } NiSO_4(NH_4)_2SO_4 6H_2O$$

$$\%SO_4 (total) - \%SO_4 \text{ for } NiSO_4(NH_4)_2SO_4 6H_2O = \%SO_4 \text{ as } NiSO_4 7H_2O$$

$$\%SO_4 \text{ as } NiSO_4 7H_2O \times \frac{NiSO_4 7H_2O}{SO_4} = \%\ NiSO_4 7H_2O$$

$$\%NiSO_4(NH_4)_2SO_4 6H_2O \times \frac{Ni}{NiSO_4(NH_4)_2SO_4 6H_2O} = \%\ Ni \text{ necessary for } NiSO_4(NH_4)_2SO_4 6H_2O$$

$$\%NiSO_4 7H_2O \times \frac{Ni}{NiSO_4 7H_2O} = \%\ Ni \text{ necessary for } NiSO_4 7H_2O$$

$$\%\ Ni\ (total) - \%\ Ni \text{ for } Ni\ SO_4(NH_4)_2SO_4 6H_2O + \%Ni \text{ for } NiSO_4 7H_2O = \%\ Ni \text{ as } NiCl_2 6H_2O$$

$$\%\ Ni \text{ as } NiCl_2 6H_2O \times \frac{NiCl_2 6H_2O}{Ni} = \%\ NiCl_2 6H_2O$$

$$\% \ NiCl_2 6H_2O \times \frac{2Cl}{NiCl_2 6H_2O} = \% \ Cl \text{ necessary for } NiCl_2 6H_2O$$

$$\% \ Na \times \frac{NaCl}{Na} = \% NaCl$$

$$\% NaCl \times \frac{Cl}{NaCl} = \% Cl \text{ necessary for NaCl}$$

$\%$ Cl for $NiCl_2 6H_2O$ + $\%$ Cl for Na Cl = the Cl determination.

Which give the following results:

Ammonium radicle	(NH_4)
Sulphate radicle	(SO_4)
Nickel	%
Cloride radicle	(Cl)
Sodium	Na
Magnesium trace	
Boric acid test positive	

Corresponds to the following:

$NiSO_4(NH_4)_2$
$NiCl_2 6H_2O$
$NiSO_4 7H_2O$
$NiCl_2 6H_2O$
NaCl
H_3BO_3 ——— (difference)
100.00

The quantitative determination of boric acid in the nickel plating solution is a quite difficult operation, and as it has very weak acid properties, I do not consider its determination of sufficient importance to warrant the trouble.

The above method of calculation, modified as predetermined conditions may require, applies to the analysis of the nickel solution. Each of the determinations in grams per c. c. multiplied by the respective factors, times 133.4 will give ounces per gallon of solution.

BRANCH NEWS

Toronto Branch

Our February meeting was a success in spite of the fact that the elements were not such as to lend encouragement to the platers' desire

to leave his cozy arm chair and join us. W. S. Barrows presented a paper on "Ferrous Metals". A study of metal structures and the treatment of ferrous surfaces preparatory to plating. Subject for discussion was "Pet Ideas", this brought out some spendid original points, on holder designing, burnishing and burnishing lubricants, and will be continued at the March meeting.

Question Box—How is the matte finish on Aluminum obtained?

Answer—Use nitric acid and water, or hydrofluoric acid and water direct from hot alkaline cleaning sol.

We are making an effort to get a speaker to address us at our next meeting, and with good weather we anticipate a full house.

New York Branch

The New York Branch of the A. E. S. held its sixteenth Annual Banquet February 17th, 1925 in the Aldine Club, 5th Ave., and 23d Street, New York City. Mr. Charles H. Proctor, founder of the A. E. S. presided at the afternoon session which was devoted to the reading of papers and discussions of Plating problems. The Banquet was held at 7:30 P. M. 417 members and guests participated in the jollification for the remainder of the evening. The Banquet was another repetition of past grand successes. New York Branch congratulates the arrangement committee and extends thanks to their patrons.

Hartford-Connecticut Valley Branch

Hartford-Conn. Valley Branch met on January 26th, at the Hartford Engineers Club, Mr. Hogaboom presiding.

Prof. Bahney of the Scovil Mfg. Co., spoke on "Copper from the Mine to the Plating Tank." He told in a very interesting way of the various processes by which copper is extracted from its ores and refined for commercial use.

At this meeting Mr. Hogaboom announced his resignation as president of this Branch, which was made necessary by his becoming an associate member. He has recently accepted a position as head of the research department of the Hausen Van Winkle Co.

Mr. Hogaboom's loss will be keenly felt by this Branch, which owes a large share of its success to his efforts.

At the meeting on February 23rd, an interesting talk on the "Jordan Process of Finishing Steel" was given by Mr. Fred Parker of Southington, Conn., who has used this finish for the past year. He displayed a large number of samples which looked very good, and answered numerous questions concerning the process.

Cleveland Branch

The Cleveland Branch met at the Hotel Winton for their regular March business meeting. The meeting was called to order at 8:00 P. M. with President Scott presiding. The report of the Sustaining Membership Committee and the Amendment Committee was approved and the Secretary was instructed to send each branch a copy and the Supreme Body. Paul R. Stamm was elected to membership. Pres. Scott appointed a Research Committee, which is composed of all practical men with from 25 to 40 years experience. The Chairman J. B. Hergist a graduate

chemist with over 25 years practical experience in plating. It is he who gave us the electro analysis of the brass solution a few years ago, and is an authority on this work and is recognized in the schools of applied science as well as the laboratories in this part of the country. The work of this committee however, is not to be put in book form, sold nor given to anyone except to members of this Society without the consent of this branch.

Boston Branch

Boston branch met Friday the 6th, at the American House at 8 P. M., with Pres. White in the chair.

After the regular order of business a motion was made that the branch meet at the office of the Boston Platers Supply Co., 202 Friend St., Boston., this offer being made to Mr. Lee, who is a member of that firm. Two members were suspended.

A discussion was had on dynamos which lasted about two hours.

Grand Rapids Branch

Grand Rapids Branch had a smoker and luncheon March 11 at the Rowe Hotel, with a very good attendance. After lunch we had our regular meeting. with President Oates in the chair. After the minutes were read and approved, President Oates turned the chair over to Lieb. Allen, who asked what the boys thought about cadmium plating. All who used it said they liked it better as a rust preventive than copper or zinc. We then had a talk on how things were done in the olden days.

Chicago Branch

Regular monthly meeting Chicago Branch held March 14, 1925 at Atlantic Hotel. Meeting called to order, with Assistant F. J. Hanlon presiding, and a very good attendance. Report from Montreal Convention Booster Committee reported that they look for a very large attendance from the reservations already made. Paper by Mr. Jacob Hoy on "Nickel Plating of Aluminum Die Castings" was read and same will be turned over for the REVIEW.

Mr. F. L. Greenwald showed samples and read paper on "Acid Copper Solutions" containing various amounts of acids and colliods.

Mr. H. A. Gilbertson showed some samples of silver-plated trays which turned pink after being in stock; same caused some lively discussion as to cause.

O. E. Servis read paper on cadimum plating with cadaylite compound.

Question Box

Question 1—What is the best way to do hot tinning on sheet copper; must tin on one side only?

Answer 1—A method called the Shoop process was recommended.

Question 2—Should the center anode rod carry more current than the outer side ones?

Answer 2—It was stated that good results were obtained this way by using three rheostats on tank.

Question 3—Has cadium plating ever been adapted successfully for rust-proofing steel auto parts previous to nickel plating?

Answer 3—Yes. There were several members mentioned who stated good results in using same.

Question 4—When nickel solution pitts what can be done to stop it?

Answer 4—One member stated that he overcame pitting by adding epsom salts to solution.

Subject for our next meeting will be "Pitting."

Bridgeport Branch's Banquet

For the best interests of our branch it was decided that this year we should hold a Banquet and Educational Session at the Stratfield Hotel, Bridgeport, Conn., on Saturday, April 18, 1925.

The Educational Session will be in charge of Mr. Charles H. Proctor, founder of our Society and the meeting will be called at 3 P. M. sharp. Interesting papers by various branches on the Electro Deposition of metals will be read and discussed. The banquet will be held at 7:00 sharp followed by dancing.

St. Louis Branch

Our regular meeting was held on March 3rd. The attendance was below average. Mr. A. Barth acted as secretary pro tem. After routine business, Librarian F. Horath led discussion on several questions which came up. E. J. Musick is trying to interest several of our members in the trip to Montreal.

Our kind friend the Supreme President, sure set some of our members just a sympathizing with me on that loss of 40 lbs. That loss concerned me the least, but I did want to lose the pain, and am glad that it is gradually going. I manage to be on the job every day this week.

Waterbury Branch

At a meeting of Waterbury Branch, A. E. S., held February 27, an interesting discussion took place relative to the most approved methods of cleaning, rolling and plating gray iron objects. Mr. George Hogaboom of the Hanson, Van Winkle Company was present and gave a talk on the composition and plating of this metal. The composition of metal dips was also touched on, the object being to give some of the members an insight into the most practical manner of making up same. The third subject taken up for discussion was relative to the most simple, practical and economical manner of obtaining a satsifactory black finish with both the electro and immersion methods.

The subject for discussion at this meeting was the questionable value of many formulas unloaded upon the plating fraternity from many sources. It brought to mind the remarks of a leading member of the A. E. S., who spoke to the members of the local branch on this subject a few years ago. At that time the speaker read formulas from a number of publications and stated that they were impractical and not worth the space taken to describe them. It was also suggested at that time, that all formulas of a doubtful nature, before being broadcasted and published, should be referred to the Research Committee of the A. E. S. for its endorsement. If this method was followed there is no question but what it would save the plater a lot of trouble and wasted effort—not to mention what it costs the employee.

Milwaukee Branch

The Milwaukee Branch met at Lipps Hall, Third and Prairie Streets at 8 o'clock, March 12th, for the regular monthly business meeting. About fifty percent of the members were present.

Mr. Hau was initiated and our President, Mr. Goodsell, welcomed the new member and pointed out in a well turned speech, the benefits to be derived by regularly attending the meetings.

Our stay-at-home members missed something good, which would, no doubt, be useful to them in their business, when they failed to attend the February educational meeting. Mr. Hayes of the Chicago Branch read a very instructive paper on "The Plating of Aluminum Die Castings." Mr. Hayes brought samples of his work, which were very good, and stated that peeling and blistering of nickel-plated die castings were practically unknown in his plant. He also answered all questions the members asked regarding his methods. Members of this Branch who did not attend this meeting and who are interested in plating aluminum die castings, missed the opportunity of asking questions of Mr. Hayes regarding details of his method which may not be clear to them when they read his published paper later on.

Mr. Hazucha of the Chicago Branch read a paper on "Brass Plating" and assisted in the discussion of some of the methods used in depositing this alloy.

Mr. Goodsell showed samples of brass-plated trunk hardware of good color and bright finish that he obtained in three minutes. He explained the methods used in his plant in obtaining uniform color work in large quantities.

MILWAUKEE MEMBERS—we expect to have some mighty interesting educational meetings and would like to see all our members present to get all they can out of this, and also give their experiences.

Detroit Branch

The regular meeting of the Detroit Branch was held on March 6, at the Detroit Engineering Society Club.

Advertising matter of the Stirlen Double Wedge Comparator was read and discussed with much interest and the following opinions expressed.

1. In principal and design this instrument covers a very important need of the practical plater.

2. That a wider range or an adjustable scale would make it better adapted for common practise.

3. That its use is a great advantage over the ordinary test papers, but its accuracy is not within the range often desired and obtainable by the Gillespie drop ratio method.

4. That its use may be misleading on account of the instability of the solution.

5. That the "recommendation" of the American Electroplaters' Society is used without authorization.

APPLICATIONS FOR MEMBERSHIP

Detroit Branch

C. J. Haeberly, Active .....c|o F. E. Westfall Co., Detroit, Mich.
W. H. Graves, Associate .....c|o Packard Motor Car Co., Detroit, Mich.

Waterbury Branch

Leroy R. Miller, Active

Milwaukee Branch

Harold M. Cherry .....1008 45th St., Milwaukee, Wis.

ELECTED TO MEMBERSHIP

Pittsburgh Branch

Walter L. Hague.....Liberty and First Ave., Pittsburgh, Pa.

Detroit Branch

H G. McIntosh, Associate.....c|o Reo Motor Car Co., Detroit, Mich.

Philadelphia Branch

Elijah Reid, Active .....120 Utica Ave., Westmont, N. J.
G. F. Hasslacher, Associate .....860 Drevel Bldg., Philadelphia, Pa.
Chas. A. Cooper, Active.....1427 Washington Ave., Chester, Pa.
F. J. Roeren, Active .....c|o U. S. Gague Co., Sellersville, Pa.
Wm. D. Farks, Active .....1611 S. Taylor St., Philadelphia, Pa.

Cleveland Branch

P. R. Stamm, Active .....947 Ellon Rd., Cleveland, Ohio

Newark Branch

Edw. J. Schorr, Active .....613 East Jersey St., Elizabeth, N. J.
Hy. J. Grall, Active .....611 Magie St., Elizabeth, N. J.

Chicago Branch

John J. Lyks, Active.....4041 Grove St., Chicago, Ill.
Frank R. Porter, Associate .....5660 W. Taylor St., Chicago, Ill.
John Teeney, Active .....1746 N. Kedzie Ave., Chicago, Ill.
Jos. A. Hall, Active .....227 N. 2hd St., Elkhart, Ind.
Geo. O. Kistler, Active .....1414 Johnson St., Elkhart, Ind.

REINSTATED

Chicago Branch

Otto Tiss.....1120 Polk Blvd., Des Moines, Iowa
Albert Kappeler .....2615 W. Madison St., Peoria, Ill.

BRIDGEPORT BRANCH BANQUET

APRIL 18, 1925

Hotel Stratford. Bridgeport, Conn.

Charles H. Proctor, George Hogaboom, Prof. Bainey and G. T. Nunning will be the speakers at the afternoon educational session